



# TEAM Stage

## Prospects for Remote Operation

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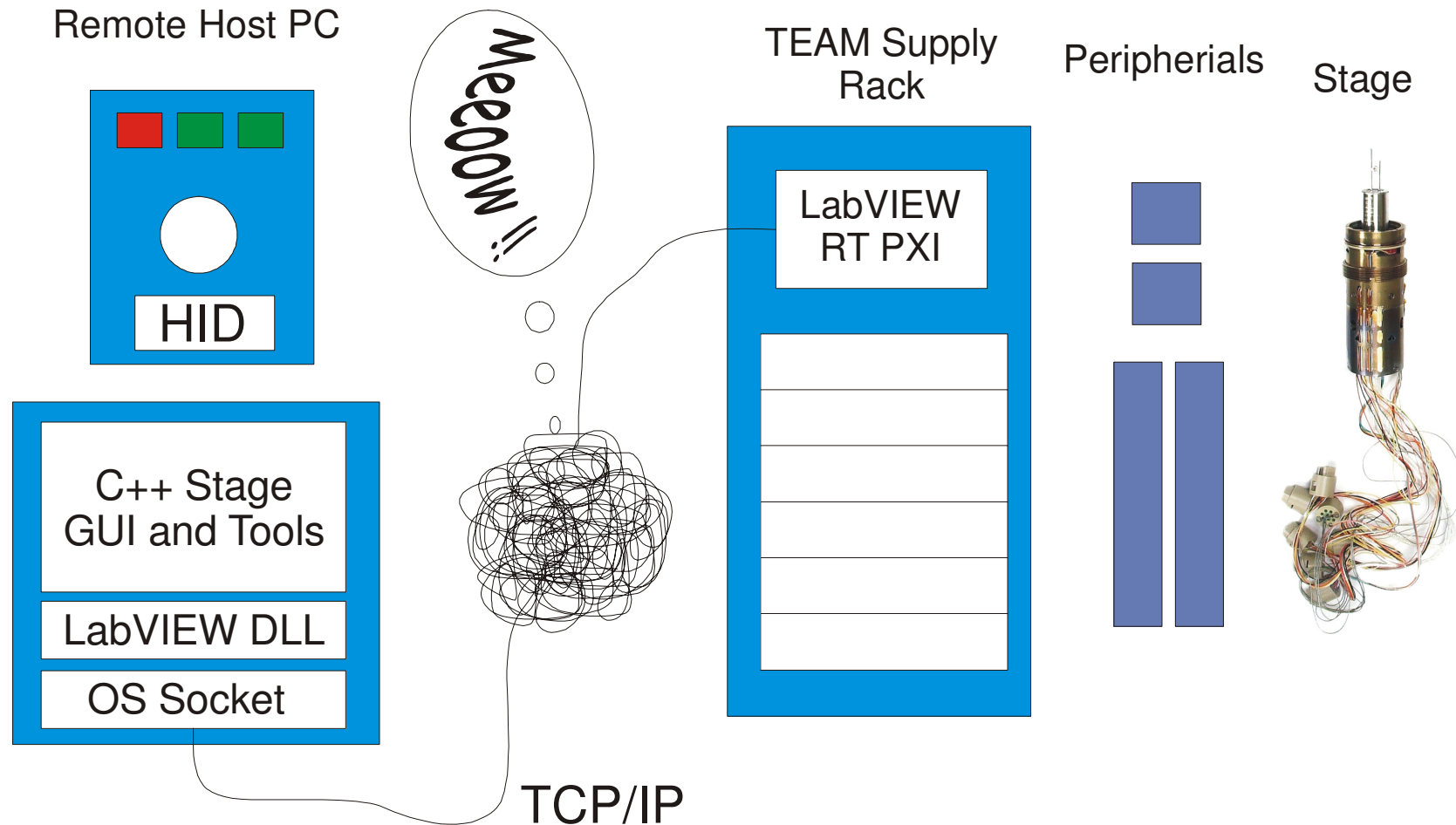
**Eric Olson and Ivan Petrov**

*FS-MRL, UIUC Urbana, IL*



# The TEAM Stage Control System

Remote operation is easy due to TCP/IP...



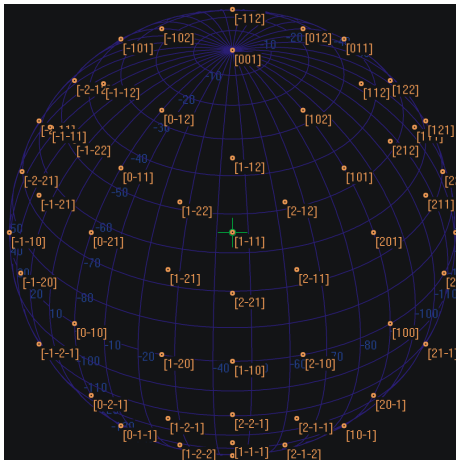
... and has been successfully demonstrated several times.



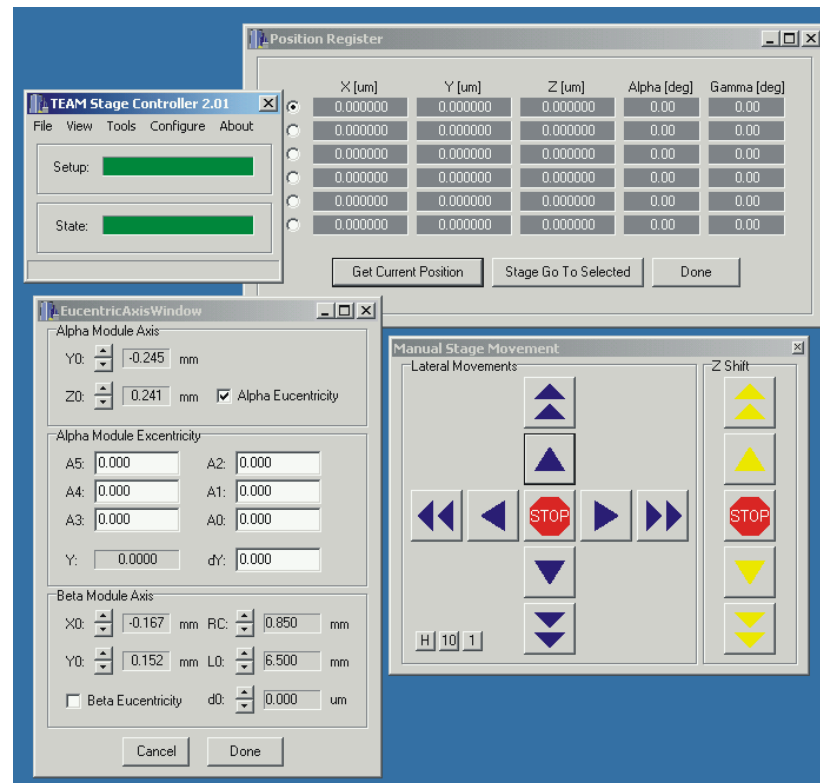
# TEAM Stage – Remote Controls

The structure of the TEAM stage software

K Space Navigation



TEAM Stage GUI

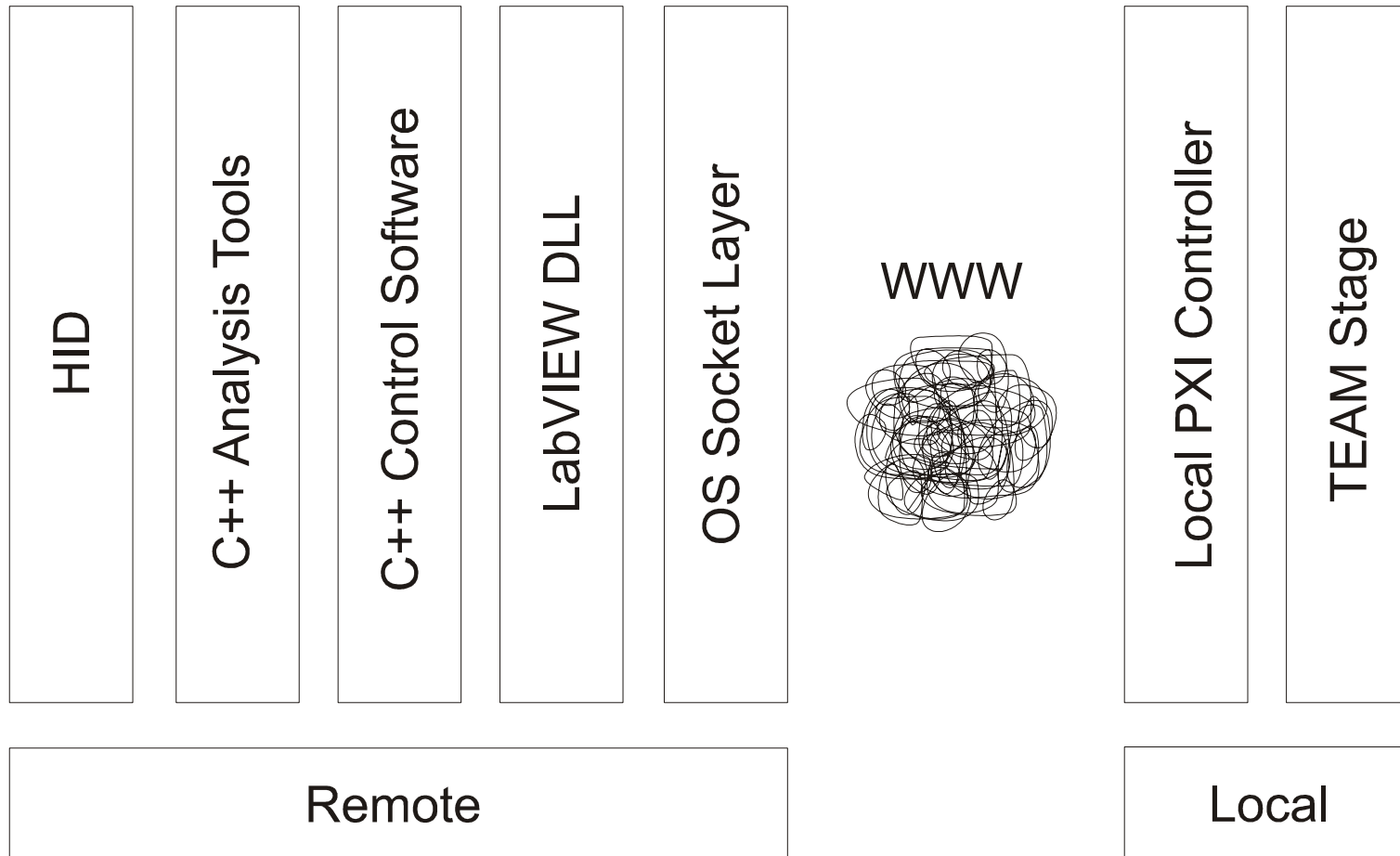


LabVIEW DLL



# TEAM Stage Control Elements

... but what parts of the system will be 'remote' ?





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# The Stage HID

## Producing or Purchasing – Compatibility and Compliance

### **Producing the HID can be useful in multiple aspects:**

- The HID can contain a secure token which enables access control
- The HID can contain the executable minimal interface – bundles software distribution and guarantees compatibility-by providing a secure flash disk memory on the USB
- HID can be tailored to the needs of electron microscopy

### **Downsides:**

- LBL is responsible for a small series production, including:
- Compliance with local regulations (CE, FCC, VDE, UL ...)
- Compatibility with e.g. USB standard, operating systems, version control,...
- Liability (e.g. ergonomic damages, consequential damages)
- Spare parts stock management and maintainable production

### **Using a standard HID results in a suboptimal layout, but**

- Is Cheaper
- The Compliance testing is done by the manufacturer
- The component is replaceable with any HID on the market at the end users liking
- Liability is reflected onto the manufacturer
- Plug and Play compatibility
- No need for spare parts stock



# The TEAM Stage Software

## Security, Maintenance and Distribution Control

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### **Distributed Software Components need to be Maintained and Controlled**

- Distributed software needs to be maintained and verified
- Updates, added functionality
- Access control mechanism needs to be in place
- Unauthorized copies of the software must not be useful to connect
- Access control mechanism should be difficult to reverse engineer
- Compatibility of all Software- and Hardware Versions needs to be validated and kept to date
- Hardware of Firmware Updates
- Obsolete Hardware

### **The Definition of the Remote Software Interface Determines Greatly the Bandwidth Need**

TEAM Stage Software has a graphically extensive analytical part (Tiltbox Vers. 1.00) which can be distributed. For the communication with the stage, a separate minimal interface can be used.

The minimal interface can also be realized through the TEAM scripting language.



# TEAM Work for the TEAM Stage...

Harness the Experts in and Gain their Multipliers !

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## **The ideal world: The Unsinkable Ship with Fail-Safe Compartments**

Security is warranted by a safe network access protocol and exclusive network infrastructure  
The network group expertise is in the loop, to guard the equipment against damage  
By hacker attacks

Software is maintained by not generally distributing it, but by merely sending a complete package eventually including the PC, which has to be sent back to LBLs NCEM.  
The installation and hardware compatibility can be verified locally  
No remote error diagnostics  
Less frustration in the field

Hardware compatibility is given by using standardized HIDs  
Plug and Play (equivalent to 'toss and replace')  
Time and money saving  
Adaptable to the user preferences

Compatibility to the FEI framework is delivered by the TEAM scripting interface  
Isolation from FEI software changes  
Isolation from Gatan Software changes

**Maximum Use of Existing Experience, Maximum Protection for Delivered, Proven Work Modules  
Software Recycling through TEAM scripting.**